NOBEL SYMPOSIA SERIES

Complexity in science

Mogens Hogh Jensen

Professor of Complex Systems and Biophysics, Niels Bohr Institute, University of Copenhagen
President of Royal Danish Academy of Science and Letters (until 2020)

Predicting the future: An old problem from a modern perspective

Angelo Vulpiani

Full Professor, University of Rome

NOBEL IN AFRICA
A STIAS INITIATIVE

Monday, 31 October 2022 | 18:00-19:50
Senate Chamber, Westville Campus, UKZN and Online

BIOGRAPHY

Mogens Hogh Jensen is a Danish physicist who has made contributions to the fields of complex dynamics and fractals. He currently holds a professorship at the Niels Bohr Institute, University of Copenhagen and is the former President and Secretary General of the Royal Danish Academy of Science and Letters.

He has received several prizes most notably the Norwegian physics prize 'Gunnar Randers' handed over in 2011 by King Harald V of Norway. He has been visiting professor at the Universities in Chicago, Rome, Fukuoka and Harvard.

ABSTRACTS

Mogens Hogh Jensen's lecture:

Complex phenomena appear all over nature. Examples are icecrystals, plants, clouds, flows in oceans, etc. which are usually associated with very beautiful patterns. We can understand and describe these phenomena and patterns by means of chaos and fractal theories. During the last decades, the research have defined a 'complexity paradigm', namely that very simple physical and mathematical systems might give rise to very complex and beautiful phenomena. In the biological world we also observe complex behavior of living systems, from ecosystems with large species, over colonies of bacteria down to the dynamics of single cells and proteins. These biological systems can successfully be described by means of physical and mathematical models which are simulated on computers and compared to laboratory experiments. Complex behavior is also studied in the societal network between people and can be investigated through activities on social media like Twitter.

Angelo Volpiani's lecture:

Predicting the future state of a system has always been a natural motivation for science and practical applications. Such a topic, beyond its obvious technical and societal relevance, is also interesting from a conceptual point of view. This owes to the fact that forecasting lends itself to two equally radical, yet opposite methodologies. A reductionist one, based on first principles, and the naive-inductivist one, based only on data. This latter view has recently gained some attention in response to the availability of unprecedented amounts of data and increasingly sophisticated algorithmic analytic techniques. I suggest that the simple-minded idea to the effect that data can be seen as a replacement for scientific modelling is not tenable.

BIOGRAPHY

Angelo Vulpiani is an Italian physicist and essayist, known for his contributions to statistical and non-linear physics.

He studied physics at the La Sapienza University of Rome, where he graduated in 1977 with supervisor Giovanni Jona-Lasinio. After three years as a fellow at the CNR in Rome, in 1981 he became a researcher at La Sapienza, then an associate professor at the University of L'Aquila before returning to La Sapienza in 1991. Since 2000 he has been full professor of theoretical physics at the Department of Physics.

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